LIBERTY

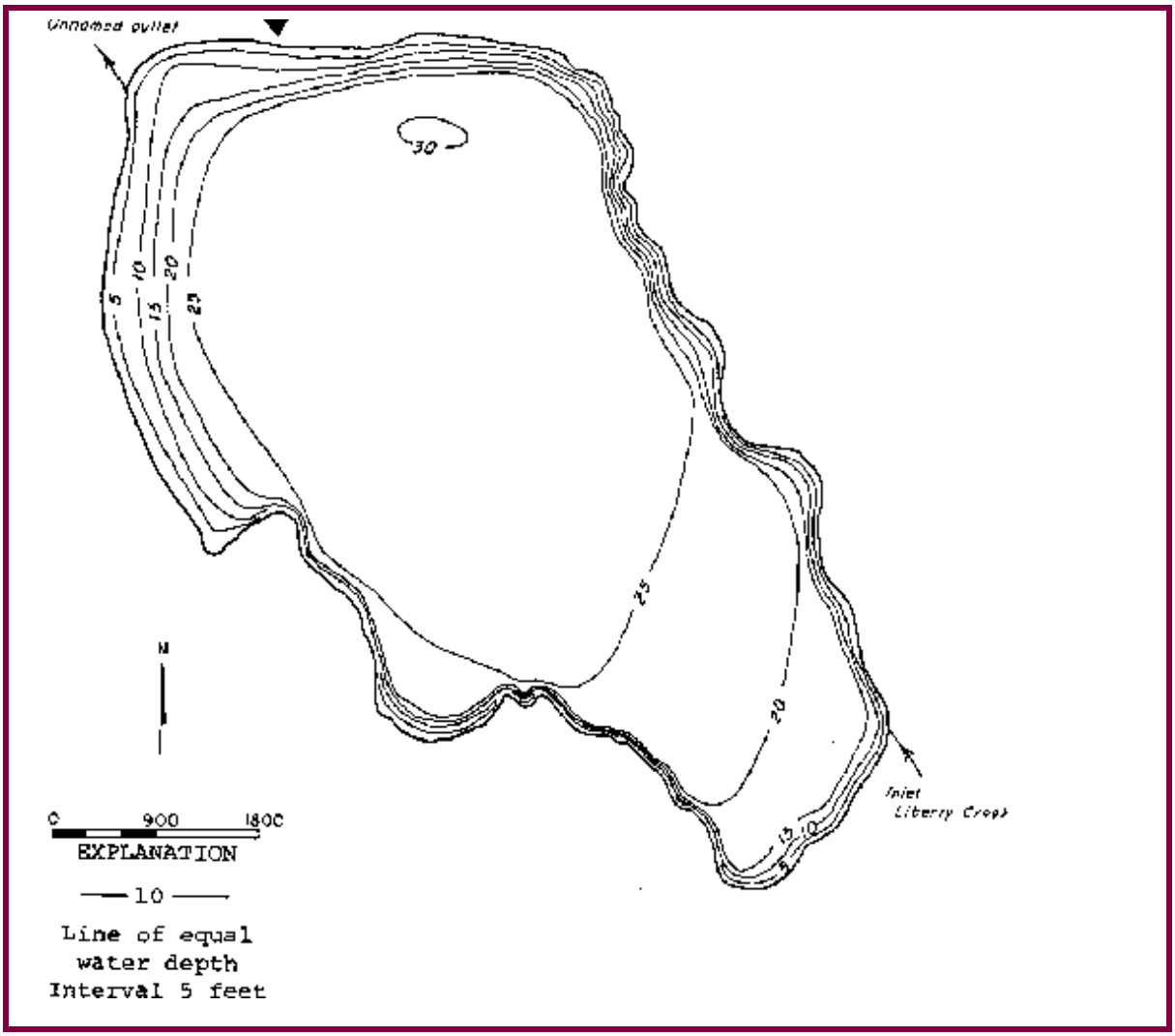
SPOKANE County

Lake ID: LIBSP1

Ecoregion: 7

Liberty Lake is a popular lake just outside the Spokane city limits to the west. Its shores are only a mile from the Idaho border. The inlet for Liberty Lake is Liberty Creek and the outlet is an unnamed creek.

Area (acres)	*Maximum Depth (ft)*	*Mean Depth (ft)*	*Drainage (sq mi)*	
710	30	23	13	
Volume (ac-ft)	***Shoreline (miles)***	***Altitude (ft abv msl)***	***Latitude***	***Longitude***
16000	4.77	2053	47 39 09.	117 05 20.



Station Information

LIBSP1

Primary Station — Station # 1 — latitude: 47 39 01.0 — longitude: 117 04 33.0

Description: Lake's deep site, several hundred meters from shore, SW of public access.

Trophic State Assessment for 1998

LIBERTY

Analyst: KIRK SMITH

TSI_Secchi:	38
TSI_Phos:	42
TSI_Chl:	39
Narrative TSI:[a]	OM

Liberty Lake has a well developed shoreline but the watershed appears to be mostly undeveloped with abundant timber and some timber harvest. The residential area around the lake is partially curbed; however, many roads run perpendicular to the lake so runoff could enter directly into the lake. The lake has undergone recent restoration efforts and is currently being monitored by both residents and by the Liberty Lake Sewer District. Dr. Funk (Washington State University) has been actively monitoring the lake for many years in conjunction with the sewer district.

Some lakeside landscaping appeared to include the use of lawn chemicals. Zooplankton samples collected in the spring suggest a healthy zooplankton population with large daphnia to support a sport fishery. Water quality measurements suggest the lake is oligo-mesotrophic; our seasonal mean TP was 13.3 ug/L. The vast majority of the user surveys were answered by lakeside residents who were primarily interested in maintaining water clarity. Several respondents reported seagulls to be a nuisance.

Dr. Funk considers nutrient deposition from wild fowl to be a threat to the water quality of the lake. He also recommends the repair of the dike separating the marsh from the lake (Funk, W. H. 2000. Water quality annual report for Liberty Lake, Washington. Submitted to Liberty Lake Sewer District).

The total phosphorus action value for Liberty Lake is 20 ug/L; however, we recommend a criterion be set at current TP levels (plus an adjustment to account for inter-annual variation) in order to protect present uses. Therefore, the recommended nutrient criterion for Liberty Lake is (13.3 + 4.1=) 17.4 ug/L total phosphorus.

[a] E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

LIBERTY

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro-phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
7/13/1998		L					1 U			

	L					3 J		
8/10/1998	L					1		
	L					2		
9/14/1998	L					8		
	L					9		
Station 1								
6/15/1998	E	11	.225	20	1.5		14.7	.6 J
	H	21.5	.225	10				
7/13/1998	E	12.9	.236	18	2.5			.8
	H	14	.236	17				
8/10/1998	E	12.9	.251	19	2.3			.6
	H	25.9	.289	11				
9/14/1998	E	16.3	.25	15	4.8			1

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than

Watershed Survey

LIBERTY

Survey Date: 9/14/1998

Land Uses (1 = Primary, 2 = Secondary, etc.)

- [ ] **Agriculture(commercial, not hobby)**
- [ ] **Commercial, Industrial**
- [ ] **Major transportation**
- [1] **Residential**
- [2] **Park, forest or natural**

Impervious surfaces (Roads and parking area): Partially Curbed

Observations (check mark denotes presence)

BMP's ☑

Sediment screen at base of Clark Ave. (which is perpendicular to the lake, separated by steep straight path to lake). Selective thinning approx. 200 yds from the water. Rds perpendicular to the lake, directly upslope have berms in poor shape.

Odors ☐

Cattle ☐ **Ducks** ☐ **Geese** ☑

A couple of geese at private park west of outlet.

Fertilizers and weed killers appear to be used in residential or agriculture area ☑

Many lawns are green and groomed, some extending to bulkhead.

Buffer zones around streams and wetlands ☐

No development around inlet stream or wetland @ S. end. Overall assessment of lake--little improvement needed.

Irrigation ☐

Survey Id: 100

Habitat Survey Summary Report

LIBERTY

Data are averages of ***10*** **Stations Surveyed** **Date of Visit:** 7/13/1998

Vegetation Type (Avg. only of sites w/ vegetation present; 1=coniferous, 3=deciduous)

Canopy Layer Avg:	1.6	**Number of stations with canopy:**	10
Understory Avg:	2.2	**Number of stations with understory:**	10

Percent Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

Canopy Layer:	**trees > 0.3 m DBH**	1.5
	trees< 0.3 m DBH	0.8
Understory:	**woody shrubs saplings**	1.6
	tall herbs, forbs grasses	0.7
Ground Cover:	**woody shrubs seedlings**	1.6
	herbs, forbs, grasses	2.7
	standing water or inundated veg	0.2
	barren or buildings	1.8
Substrate Type (within shoreline plot):	**bedrock**	0.7
	boulders	0.8
	cobble/gravel	0.7
	loose sand	2.3
	other fine soil/sediment	0.4
	vegetated	1.5
	other	0.6
Bank Features:	**angle (O:<30; 1: 30-75; 2:nr vertical)**	0.4
	vertical dist (M from wtrln to high wt):	0.2
	horiz. dist. (M from wtrln to high wt):	0.2

Human Influence (0 = absent, 1 = adjacent to or behind plot, 2 = present within plot)

buildings	1.4
commercial	0.0
park facilities	0.1
docks/boats	1.6
walls, dikes, or revetments	1.6
litter, trash dump, or landfill	0.2
roads or railroad	0.1
row crops	0.0
pasture or hayfield	0.0
orchard	0.0
lawn	1.4
other	0.0

Physical Habitat Characteristics

station depth (at 10 m from shore)	1.7

Bottom Substrate (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

bedrock	0.3
boulders	0.4
cobble	0.8
gravel	1.5
sand	2.3
silt	1.3
woody debris	0.1

Macrophyte Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

submergent	1.5
emergent	0.2
floating	0.1
total weed cover	1.6
Do macrophytes extend lakeward (-1 = yes, 0 = no)	-1.0

Fish Cover (0 = absent, 1 = Present but sparse, 2 = moderate to heavy)

aquatic weeds	1.3
snags	0.0
brush or woody debris	0.0
inundated live trees	0.0
overhanging vegetation	0.5
rock ledges or sharp dropoffs	0.2
boulders	0.4
human structures	1.4

Questionnaire

LIBERTY

Results compiled from 21 **Surveys.** **Average time (years) respondents spent on lake:** 26.05

Did the following add (+1), detract (-1), or have no effect (0) on your enjoyment of the lake today?

Types of WaterCraft:	-0.6	View:	0.8	Distance to Lake:	0.5
Public Access:	-0.2	Swim Beach:	0.5	Canada Geese:	-0.2
Water Clarity:	0.4	Water Qual. for Swim:	0.4		
Fishing Quality:	0.3	Aquatic Plants:	-0.6		

On a scale of 1 (poor) to 5 (excellent), how would you rate water quality today? **3.5**

Which would you rather have, 1 or 2?

1) Better fishing and more natural habitat, or 2) clearer water?	1.8
1) Better fishing and more natural habitat, or 2) fewer aquatic plants?	1.4
1) Clearer water, or 2) fewer aquatic plants?	1.2

How important is each of the following characteristics to you (1 = very undesirable, 5= very desirable):

Restricted Watercraft:	4.1	Good Warmwtr Fishing:	3.4	Natural Scenery:	4.6
Plant Growth:	2.6	Good Swimming:	4.8	Public Beach:	2.9
Natural Shoreline:	3.6	Less Algae:	4.5	Canada Geese:	3.0
No Odors:	4.0	Public Access:	2.6		
Good Coldwtr Fishing:	3.1	Clear Water:	4.8		

Tabulated Results

Survey ID	Date	Residency		Rent or Own	Primary Activity*	Water Clarity: Purchase Factor?	Water Clarity: Has it Changed?	Water Clarity: When?
5	9/28/1998	Visitor			2	☐	Unknown	
	Would like more shoreline access. Should have questions about fishing access.							
6	9/28/1998	Resident	Permanent	Rent	6	☑	Better	
	We have too many ducks--they do not add to the clarity of the water.							
12	9/28/1998	Resident	Permanent	Rent	10	☑	No	
13	9/28/1998	Resident	Permanent	Rent	10	☑	Unknown	
	Personal watercraft are irritating and at times dangerous on this small, crowded lake (ski-dos, wave-runners, etc.)							
14	9/28/1998	Resident	Permanent	Rent	6	☑	Better	early 90s
15	9/28/1998	Resident	Permanent	Rent	living	☐	Worse	after first po
16	9/28/1998	Resident	Permanent	Rent	10	☑	Worse	1994-1995
	Remove swimmer's itch--goes with getting rid of plants and snails. Plants were not introduced naturally and should be removed.							
17	9/28/1998	Resident	Permanent	Rent	7	☑	Better	1990
18	9/28/1998	Resident	Permanent	Rent	1	☐	Better	1998
19	9/28/1998	Resident	Permanent	Rent	10	☑	Better	
	Would like to see the ducks, seagulls and geese eliminated. They are causing more pollution problems than anything else.							
20	9/28/1998	Resident	Permanent	Rent	4	☑	Better	
21	9/28/1998	Resident	Permanent	Rent	7	☑	No	
22	9/28/1998	Resident	Permanent	Rent	7	☑	Better	When sewer
23	9/28/1998	Resident		Rent	4	☑	Better	since the 70
	Seagulls are a nuisance							
24	9/28/1998	Resident	Permanent	Rent	10	☐	Worse	
25	9/28/1998	Resident	Permanent	Rent	4	☑	No	
26	9/28/1998	Resident	Permanent	Rent	10	☐	Better	80s after the
	Manage a control public access. Remove it from high residential area and restrict it to current county park including boater access.							
27	9/28/1998	Resident	Permanent	Rent	none	☐	No	
	I was born here 82 years ago. I remember good fishing (no trout), algae and a great pleasure lake. Now it is almost a closed lake for the very few. How sad.							
28	9/28/1998	Resident	Permanent	Rent	many of the above	☑	Unknown	clarity very
29	12/31/1998	Resident		Rent		☐	Unknown	
87	9/28/1998	Resident	Permanent	Rent	10	☑	Better	

* 1=canoe/kayak, 2=fish, 3=pers. wtrcrft, 4=mtrboat, 5=sail, 6=swim/wade, 7=watch wldlf, 8=ski, 9=windsurf, 10=relaxing

Zooplankton Report

LIBSP1

Date 6/15/1998 Station: 1

Sample ID 15

Number of organisms measured: 116

Group	Percent	Group	Percent
Cladoceran	25.9%	Small < 1mm	77.6%
Copepod	74.1%	Large >= 1mm	22.4%
Other		Ratio of large to Small:	0.29
		Average size (mm):	0.56

Date 8/10/1998 Station: 1 Sample ID 9

Lots of large rotifers

Number of organisms measured: 119

Group	Percent	Group	Percent
Cladoceran	7.6%	Small < 1mm	77.3%
Copepod	92.4%	Large >= 1mm	22.7%
Other		Ratio of large to Small:	0.29
		Average size (mm):	0.53

Aquatic Plant Data

LIBERTY

Sampler: Parsons, O'Neal

Survey Date: 7/13/1998

Max depth of growth (M): 6.5

Comments Breezy, partly cloudy. Nice plant community. Few plants in water less than 1.5 m deep, deeper water with plants approaching surface to 3 m deep. Deep water with Elodea, P. pusillus and Chara. Mergansers, greebes, osprey. Did habitat survey for Kirk Smith.

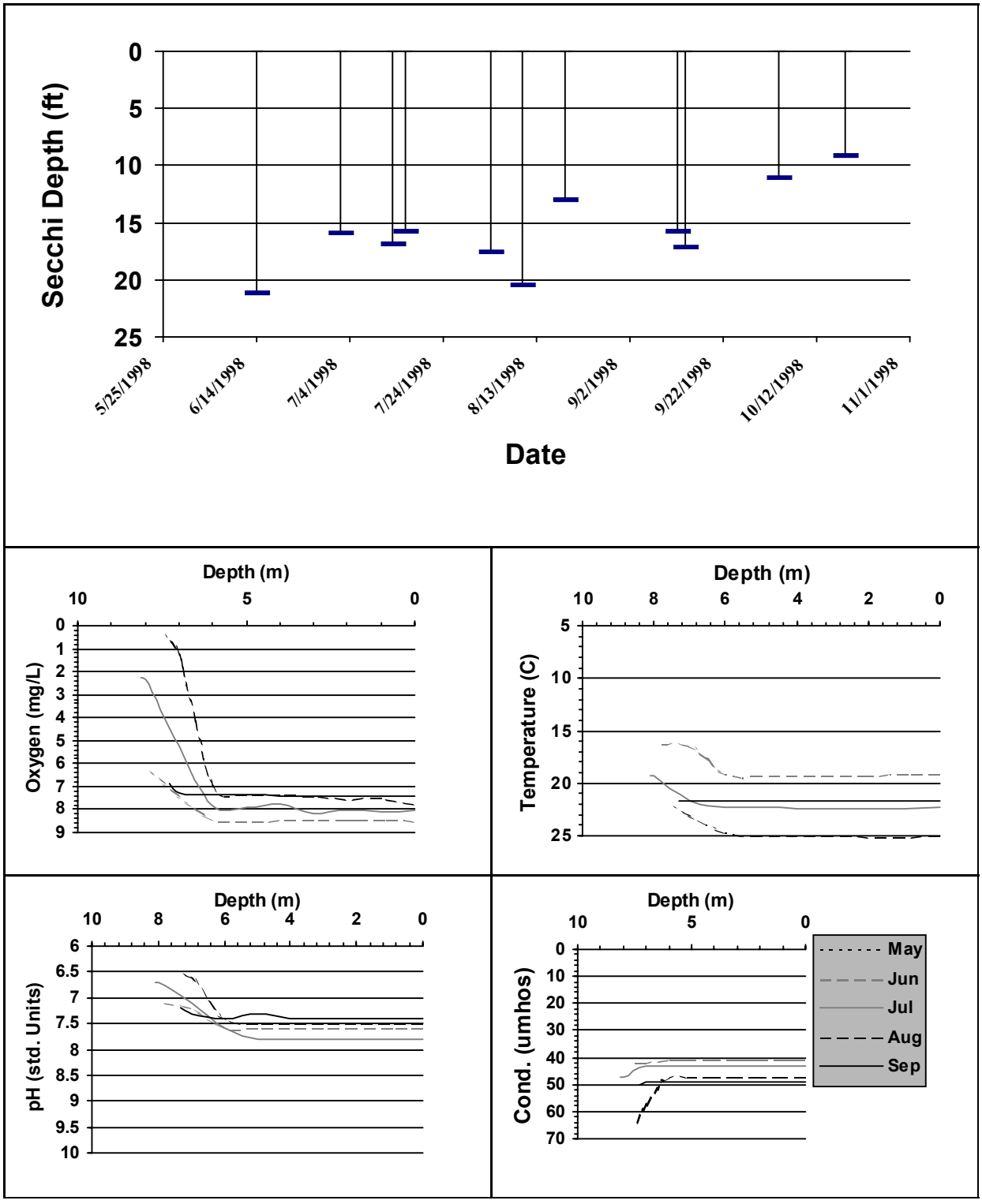
SPECIES LIST

Scientific Name	Common Name	Dist [a]	Comments
Chara sp.	muskwort	2	in shallow to deep water
Elodea canadensis	common elodea	3	blooming
Myriophyllum spicatum	Eurasian water-milfoil	1	seen at wetland, south end, several plants (also known from north end)
Nuphar polysepala	spatter-dock, yellow water-lily	2	
Phalaris arundinacia	reed canarygrass	2	most in wetland, south end
Phragmites communis	common reed	1	
Potamogeton amplifolius	large-leaf pondweed	3	
Potamogeton pusillus	slender pondweed	2	
Potamogeton robbinsii	fern leaf pondweed	3	
Potamogeton sp (thin leaved)	thin leaved pondweed	2	may also be P. pusillus, in deep water
Scirpus sp.	bulrush	2	bulrush, south end

[a] 0 - value not recorded (plant may not be submersed)
1 - few plants in only 1 or a few locations
2 - few plants, but with a wide patchy distribution
3 - plants in large patches, codominant with other plants
4 - plants in nearly monospecific patches, dominant
5 - thick growth covering substrate to exclusion of other species

Secchi Depth and Profile Graphics

Station: 1 LIBSP1



Secchi Data and Field Observations

LIBERTY

Date	Time	Temp-erature (F)	Secchi (ft)	Color (1-greens, 11-browns	Bright-ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
Station 1													
6/14/1998		19.5	21.2	6	50	3	3	5	5	0	0	2	3
	Sampler: KLAPP			Remarks:									
6/14/1998		19.5	21.2	6	100	1		5	5	0	0	0	0
	Sampler: HALLOCK			Remarks: 2 PARTIES BANK FISHING AT ACCESS. MOSTLY TIMBER IN WSHED. SHORELINE DEVELOPED HEAVILY IN SOME AREAS. ALL SEWERED.									
7/2/1998		22.2	15.83	6	0	3	2	5	5	0	0	0	1
	Sampler: KLAPP			Remarks: FORGOT THE VIEW TUBE THIS TIME BUT EXPECT TO USE IT REGULARLY.									
7/13/1998			16.8	6	20	3		5	5	0	25	3	1
	Sampler: HALLOCK			Remarks: ONE TRAILER AT ACCESS. TWO OTHERS FISHING AT ACCESS									
7/16/1998		25	15.7	6	0	1	1	5	5	0	1	2	2
	Sampler: KLAPP			Remarks:									
8/3/1998		27	17.6	6	0	2	2	5	5	0	3	1	2
	Sampler: KLAPP			Remarks:									
8/10/1998			20.46	6	0					0	9	2	2
	Sampler: HALLOCK			Remarks: VOL HASN'T SEEN GEESE ON THE LAKE SINCE GOLF COURSE OPENED. GLEOTRICHIA IN WATER COLUMN.									
8/19/1998		23.8	13	6	0	2	1	5	5	0	5	0	2
	Sampler: KLAPP			Remarks:									
9/12/1998		23	15.7	6	0	1	2	5	5	0	4	0	2
	Sampler: KLAPP			Remarks:									
9/14/1998			17.16	6	0			4	4	2	0	1	0
	Sampler: HALLOCK			Remarks: GLEOTRICHIA PRESENT IN WATER COLUMN. COUNTY PARK IS ACCESSIBLE BY ROAD.									

Date	Time	Temp-erature (F)	Secchi (ft)	Color (1-greens, 11-browns	Bright-ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
10/4/1998		16.2	11.1	6	50	2	1	5	5	0	5	0	0
	Sampler: KLAPP				Remarks: "PECTINATELLA" NOTED 9/12/98.								
10/18/1998		12.3	9.1	6	0	1	3	5	3	0	2	0	0
	Sampler: KLAPP				Remarks:								